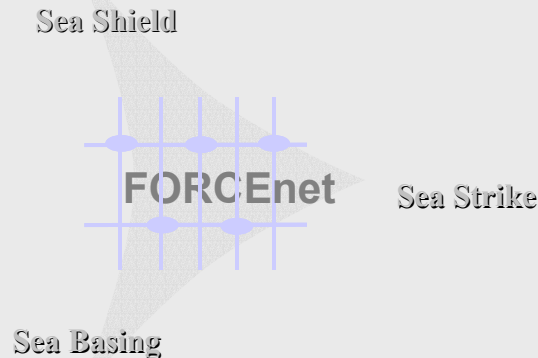# Composeable FORCEnet Command and Control

Sea Shield

FORCEnet

Sea Strike

Sea Basing

**The Ninth International Command and Control
Research and Technology Symposium
Copenhagen, Denmark
September 14-16, 2004**

George Galdorisi

**Director, Decision Support Group
Space and Naval Warfare Systems Center, San Diego**

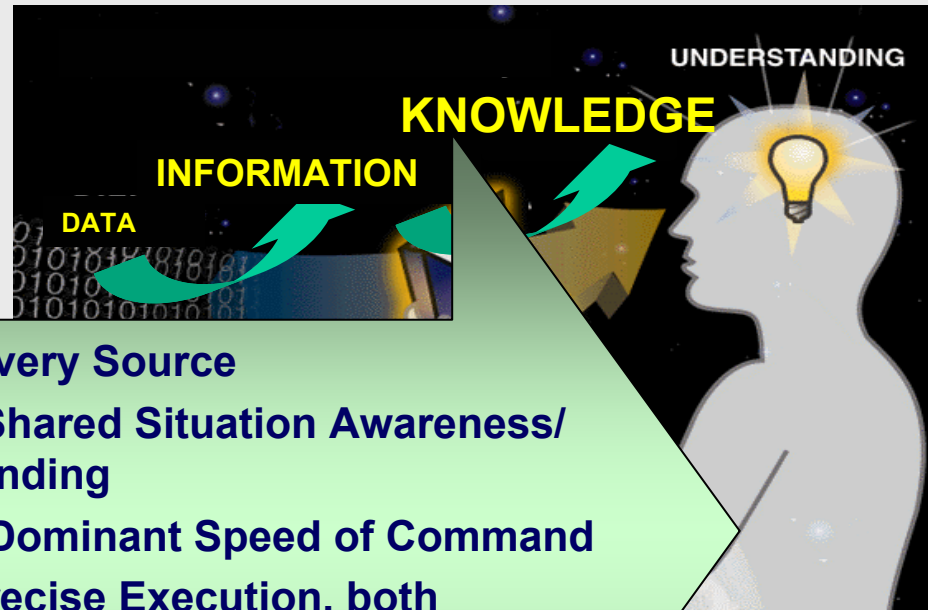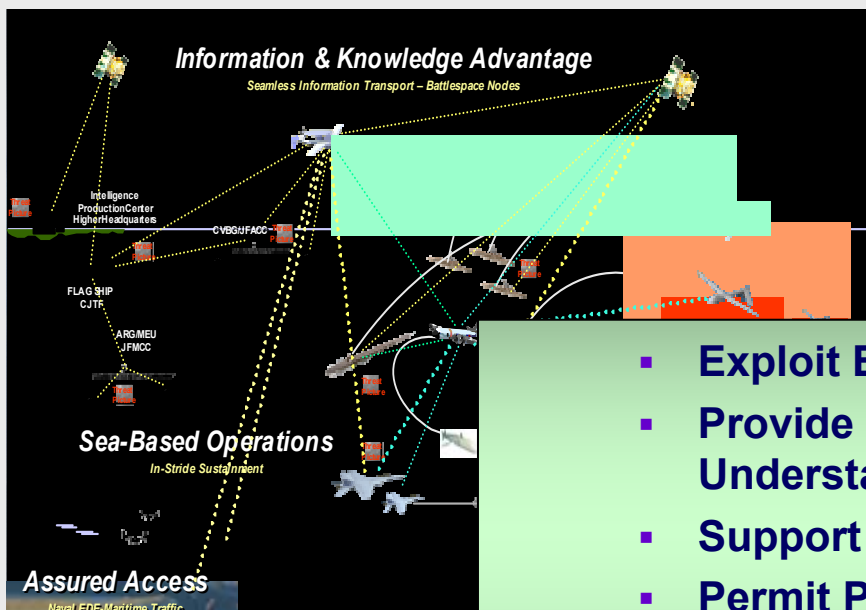| 1. REPORT DATE **2004**	2. REPORT TYPE	3. DATES COVERED **00-00-2004 to 00-00-2004**
4. TITLE AND SUBTITLE **Composeable FORCEnet Command and Control**		5a. CONTRACT NUMBER
		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)		5d. PROJECT NUMBER
		5e. TASK NUMBER
		5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Space and Naval Warfare Systems Center, San Diego,53560 Hull Street,San Diego,CA,92152-5001**		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)
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15. SUBJECT TERMS		

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES **24**	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**			

Warfighting in the 21st Century

Information & Knowledge Advantage
Seamless Information Transport – Battlespace Nodes

Intelligence
ProductionCenter
HigherHeadquaters

CVBG/JFACC

FLAG SHIP
CJTF

ARG/MEU
JFMCC

Sea-Based Operations
In-Stride Sustainment

Assured Access
Naval FDF-Maritime Traffic

UNDERSTANDING
KNOWLEDGE
INFORMATION
DATA

- **Exploit Every Source**
- **Provide Shared Situation Awareness/ Understanding**
- **Support Dominant Speed of Command**
- **Permit Precise Execution, both Synchronous & Asynchronous**
- **Agility and Flexibility**

In An Information Dense World
## - FORCEnet Provides Knowledge to the Edge -

What Is FORCEnet?

Network Centric Warfare Is the Theory

Net-centric Operations Is the Concept

FORCEnet Is the Process of Making the Theory and Concept a Reality

"FORCEnet Is the Operational Construct and Architectural Framework for Naval Warfare in the Information Age Which Integrates Warriors, Sensors, Networks, Command and Control, Platforms and Weapons Into a Networked, Distributed Combat Force, Scalable Across the Spectrum of Conflict From Seabed to Space and Sea to Land."
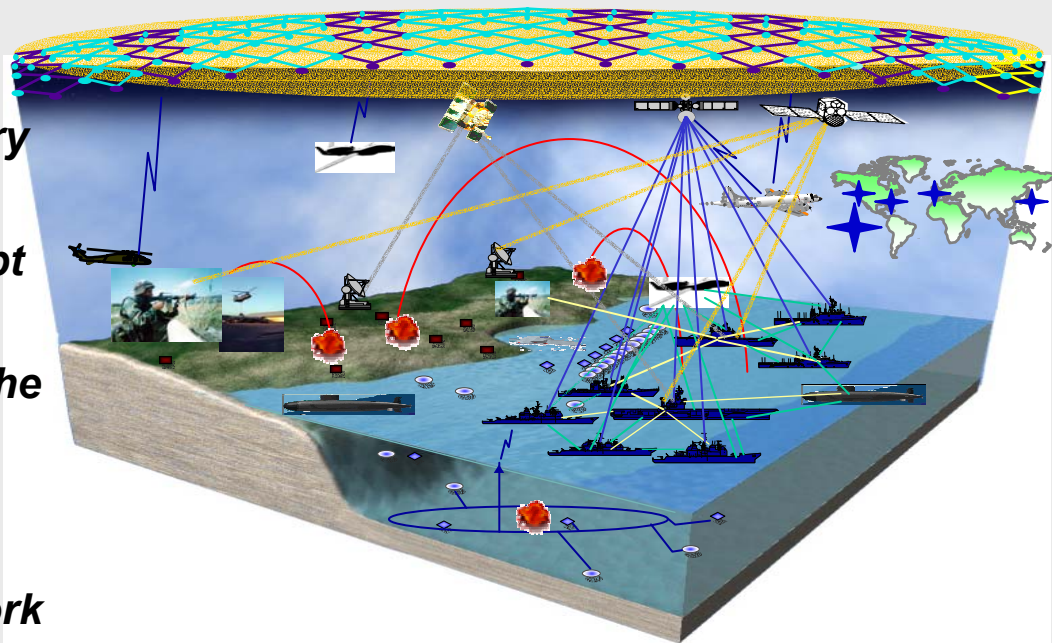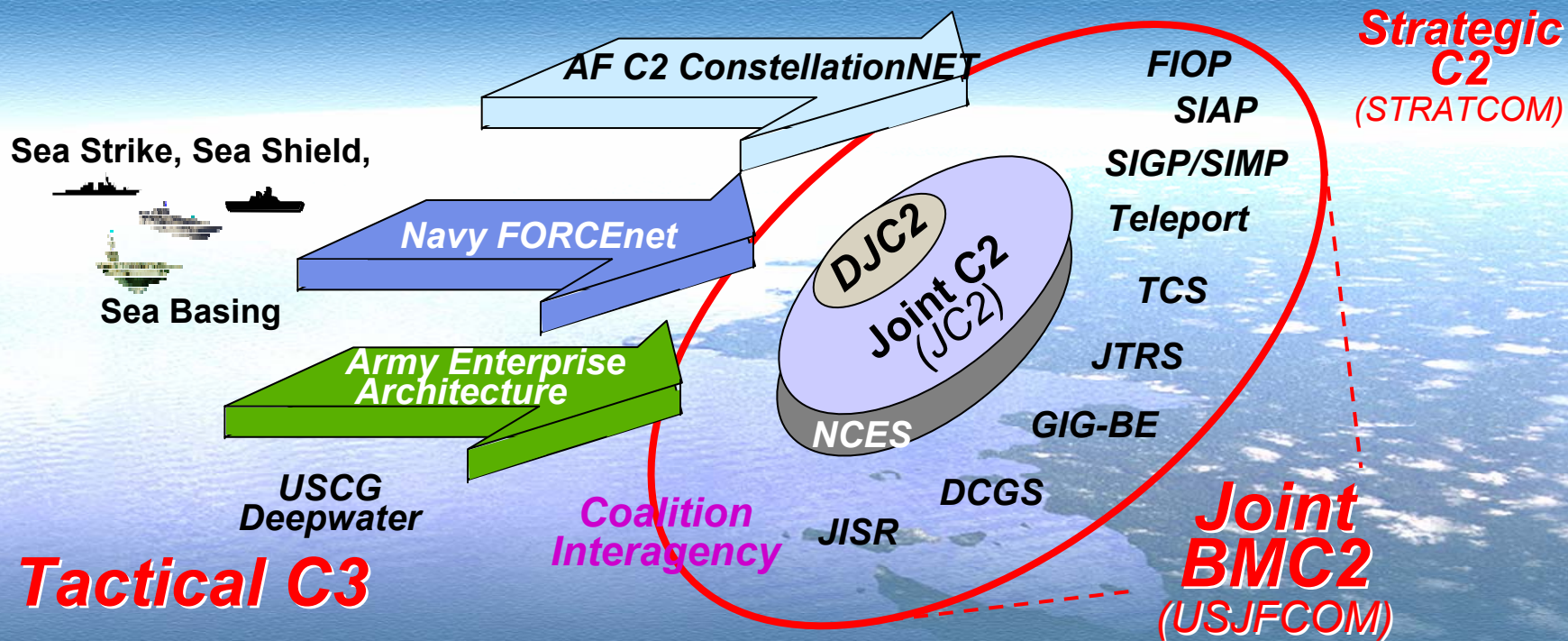
- FORCEnet Is Not
  - A Program of Record
  - A Redundant Effort
  - A Box or System
  - Just a Network

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SPAWAR Systems Center San Diego

FORCEnet

The *Naval* component of the Global Information Grid

Key Components of Joint Battle Management C2
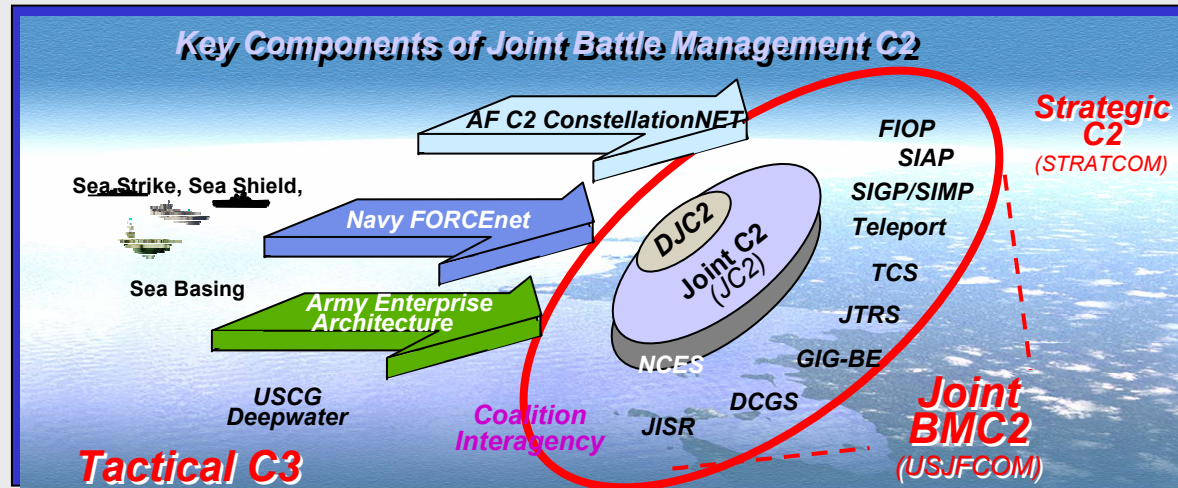
FORCEnet means:

- A warfighter, or organization, can collaborate with anyone, anywhere, anytime
- Warfighters can allocate bandwidth and priorities for applications and individuals and define their own QOS
- Warfighters can get sensor coverage when and where they need it
- Warfighters can tailor their information requirements and presentations to support their missions
- Warfighters can put the right weapon on the right target

Technology Building Blocks of FORCEnet
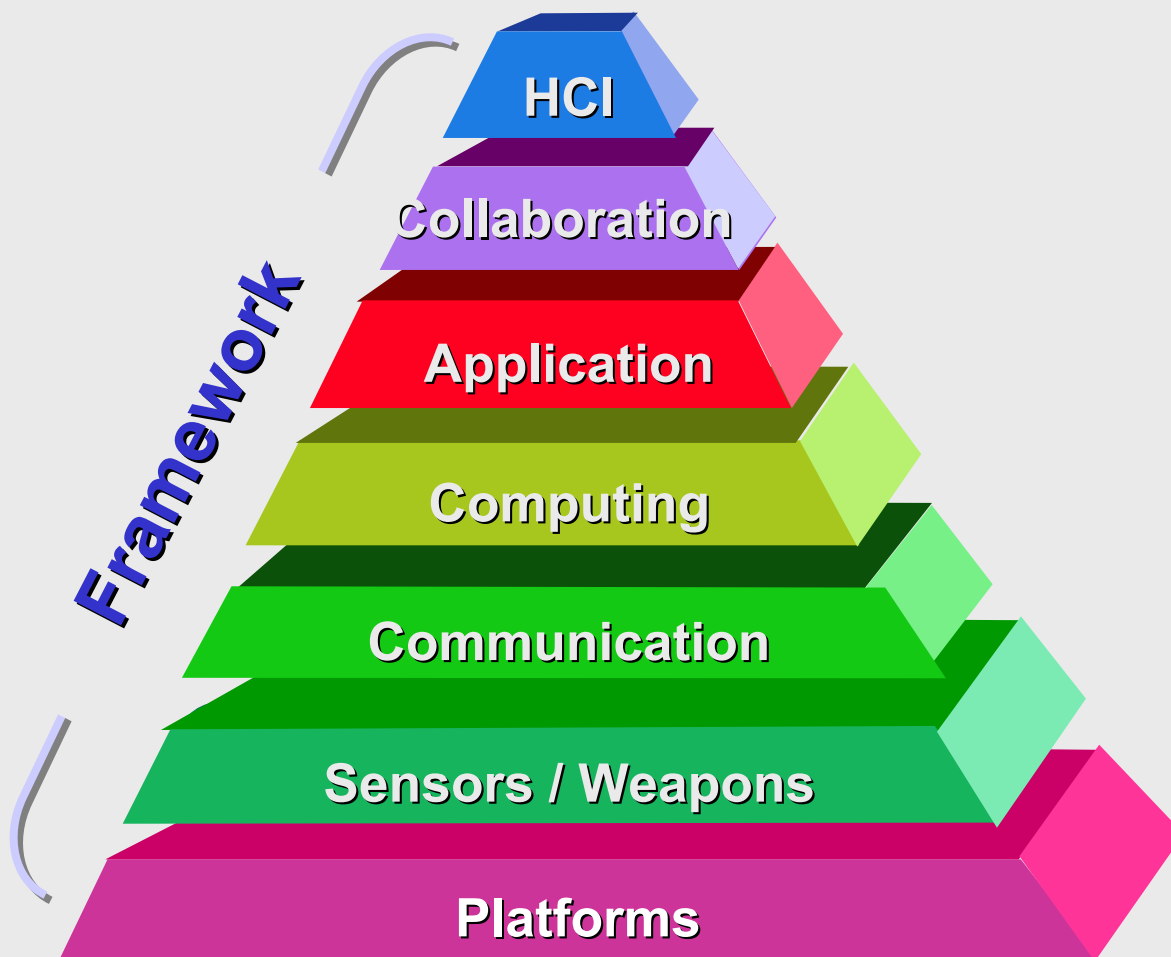
FORCEnet Capabilities Are "Composed" of Technologies
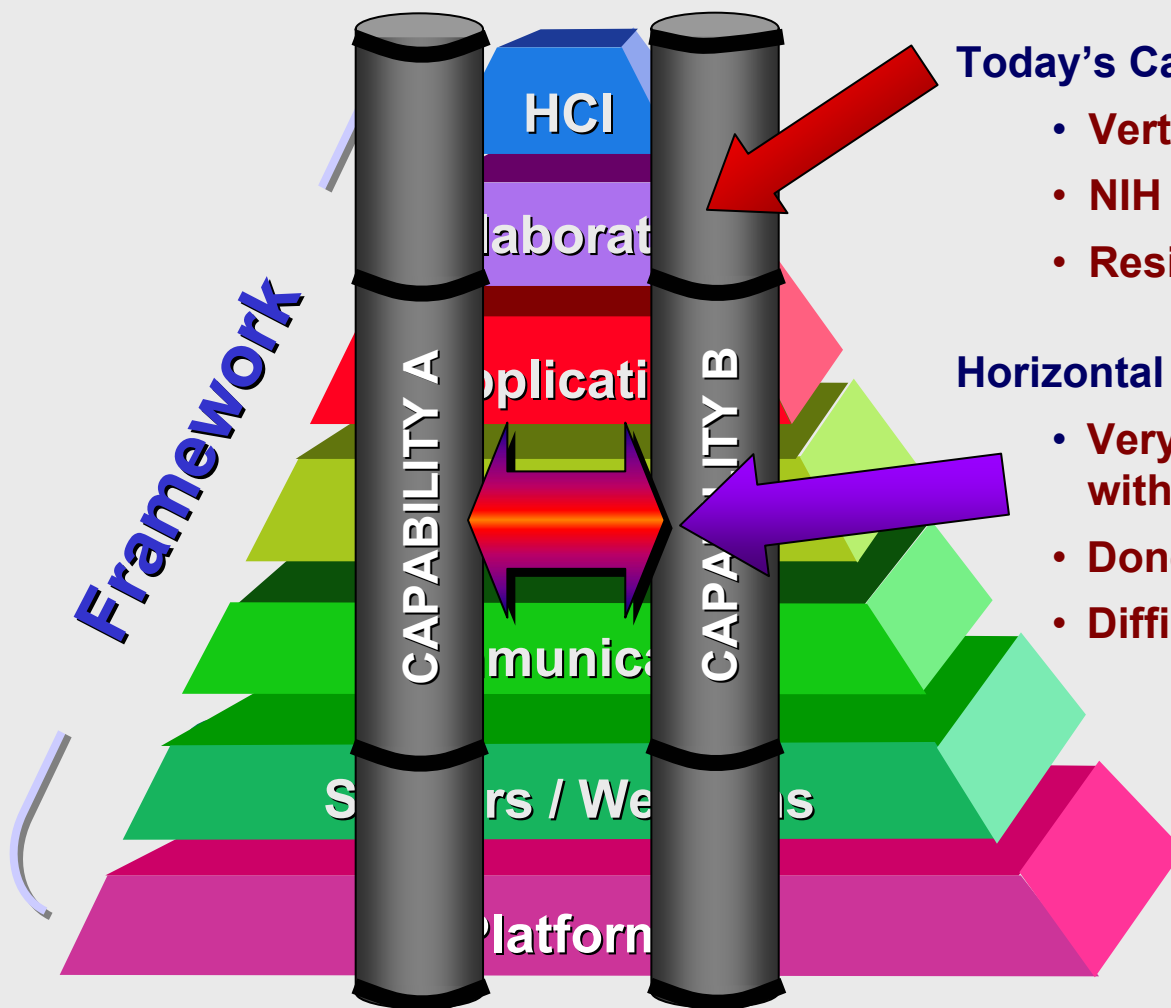
Today's Capabilities:

- **Vertically Integrated Stovepipes**
- **NIH often suboptimizes capability**
- **Resistant to new technology**

Horizontal integration is:

- **Very costly, increases exponentially with the number of systems**
- **Done case by case by experts**
- **Difficult, at best, to sustain**

Systems-of-Systems increase non-interoperability over time

Interoperability and Access Through Composeablity

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Composeable Web Services provide common interfaces across uncommon technical solutions

- Metaphors
- Standards
- Object Framework, Semantic Web
- Agents, Virtual Machines
- Internet Protocols
- Markup Languages

CAPABILITY A

CAPABILITY

Framewo

Platforms

You use this approach at home and at the office every day
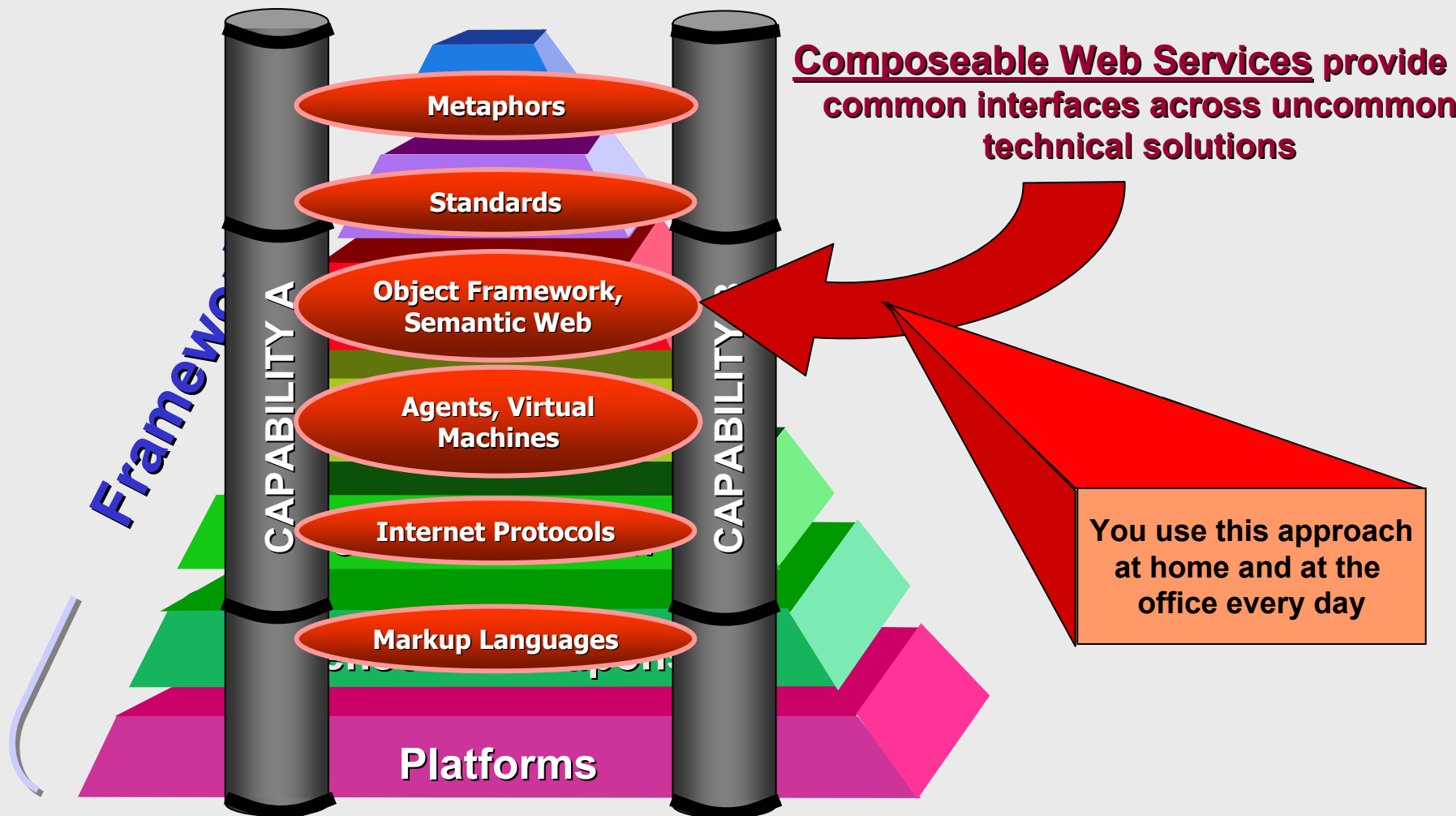
Composeable FORCEnet
Services-oriented Information Architecture
(residing on the GIG network)

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Transformational Operations – Transformational Acquisition

Iraqi Freedom

ESM Messaging Mediation Security User Asst

Discovery Collaboration Storage App

Mission Requirements

Technical Capabilities
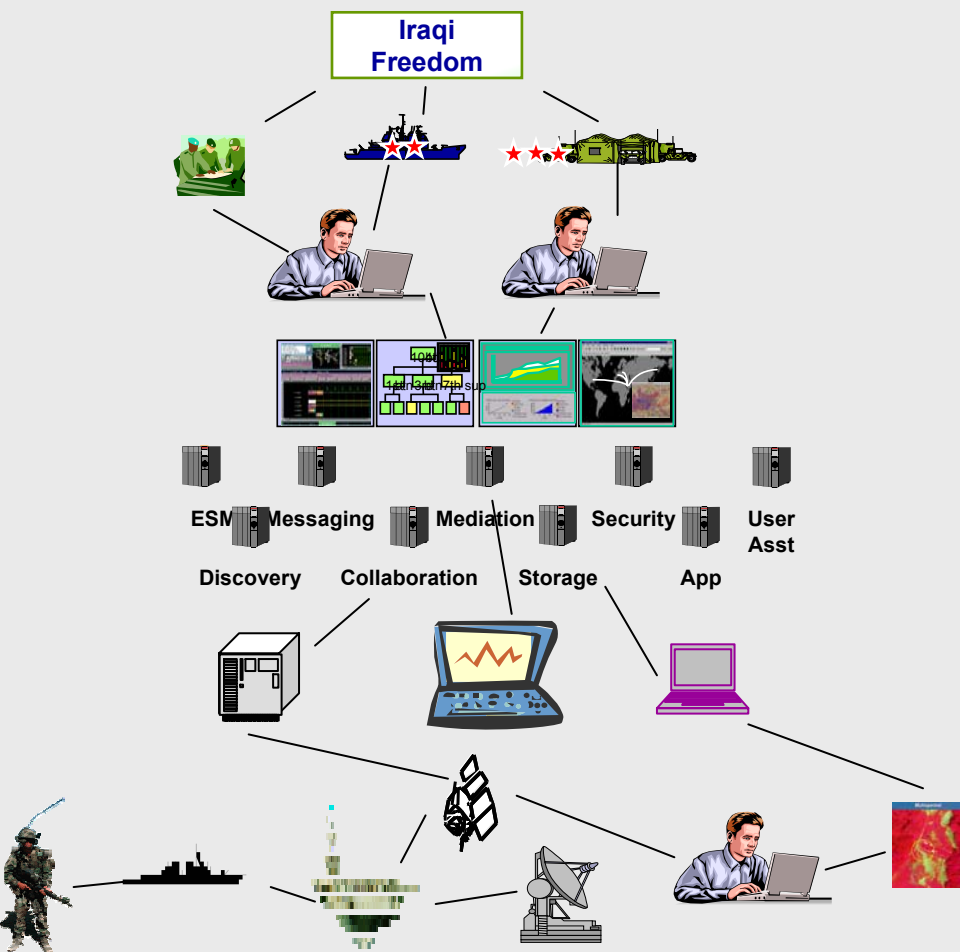
Composeable Doctrine

Composeable Organizations

Composeable COI's

Composeable (UD) Pictures

Composeable Services

Composeable Hardware

Composeable Sources

Mandated Services-Oriented Architecture Implies a Mandate for Composeability

- **DoD Integrated Interoperability Plan**
  - **ASD (NII) will establish open architecture design guidance for C2 systems using a distributed services and publish-subscribe framework**
 - **DISA and Services submit plans and investment strategy to complete transition of GCCS variants & TBMCS to the JC2/UDOP NCES architecture by FY08**
  - **JFCOM coordinate with Air Force/Army to <u>redirect</u> <u>funding</u> after FY04 from integrating legacy systems to building, integrating NCES-compliant joint mission applications for JC2**
  - **Navy provide plan and investment strategy to migrate Mission Planning & Rehearsal (MP&R) systems <u>to JC2</u> by FY08**

- **USJFCOM Joint Transformation Roadmap**
  - **USJFCOM, in its JBMC2 development role assigned by MID 912, will be responsible for guiding and overseeing the development of operational and tactical level C2 capabilities. (JBMC2 Roadmap currently under development)**
  - **USJFCOM recommends that the Joint C2 Functional Capabilities Board use JC2/GIG-ES as the single, common foundation**

- **CNO/N61 032243Z DEC 03**
  - **Once GIG CES is implemented, all existing programs of record must <u>transition to the</u> <u>GIG CES</u> or <u>risk</u> <u>losing funding</u>**
  - **The consequence for not fully engaging in this DOD initiative could be detrimental to DON's future warfighting capability**
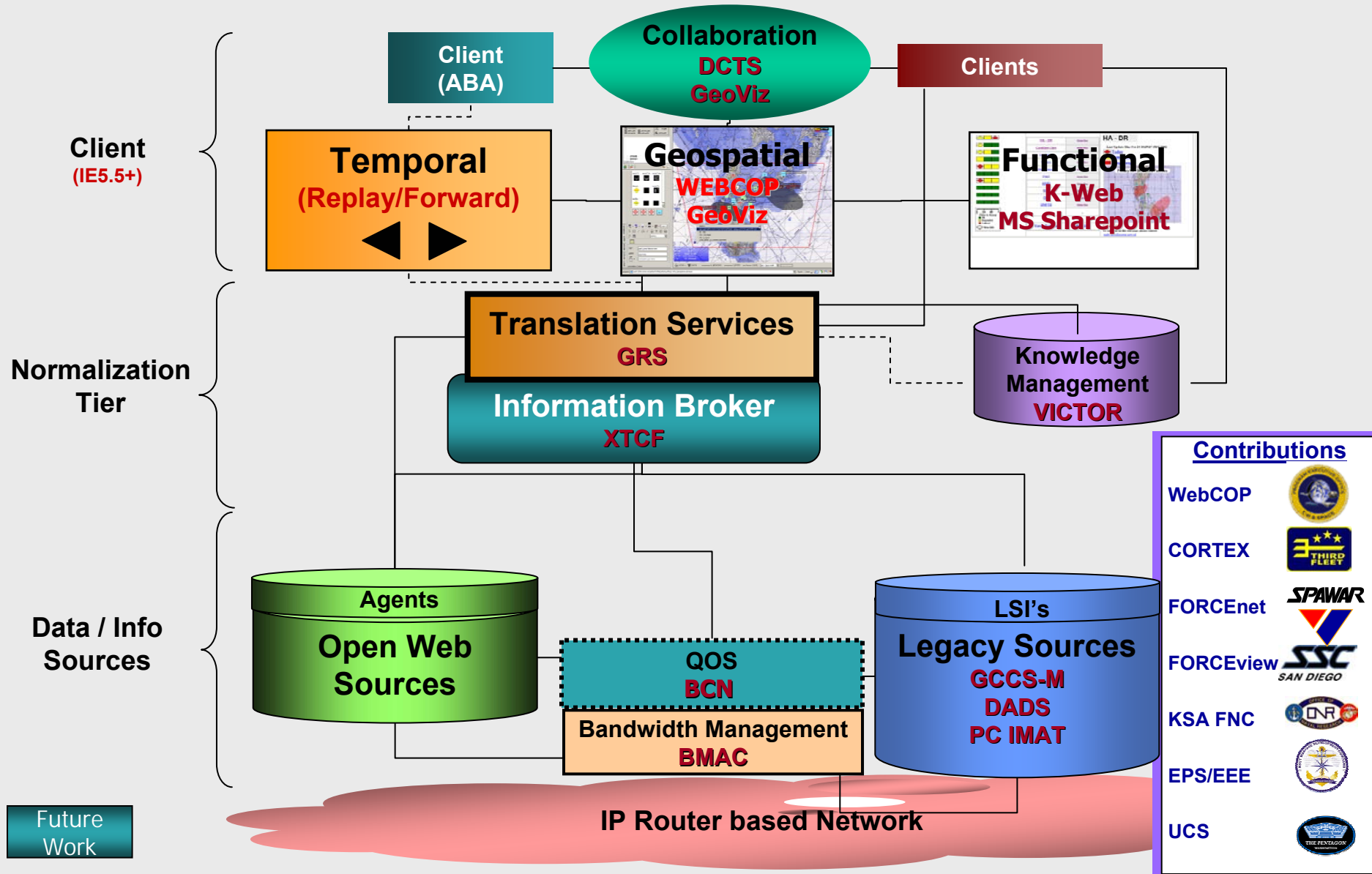
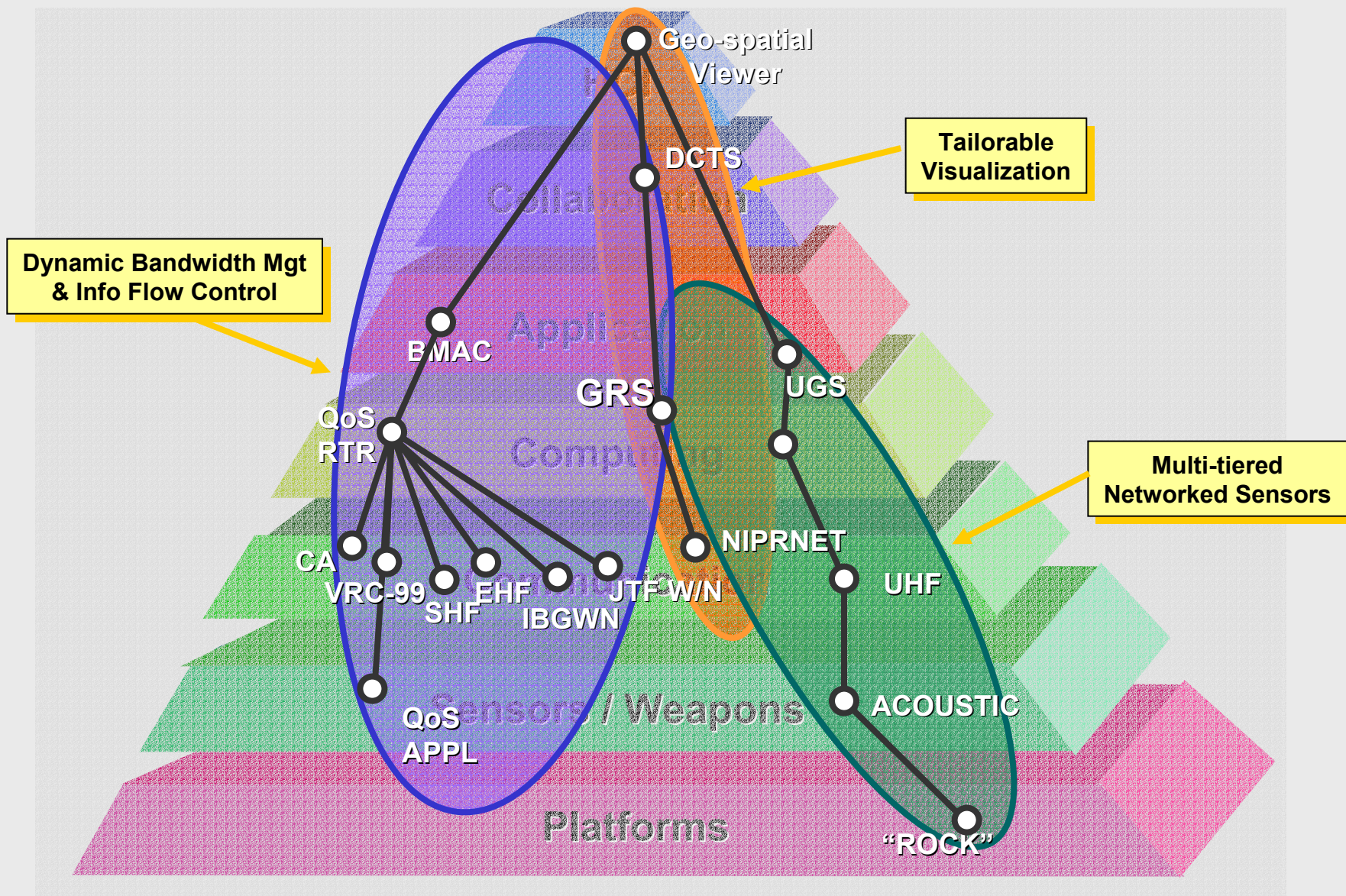# Demonstration Architecture
"Yeah, that's what I'm talking about"
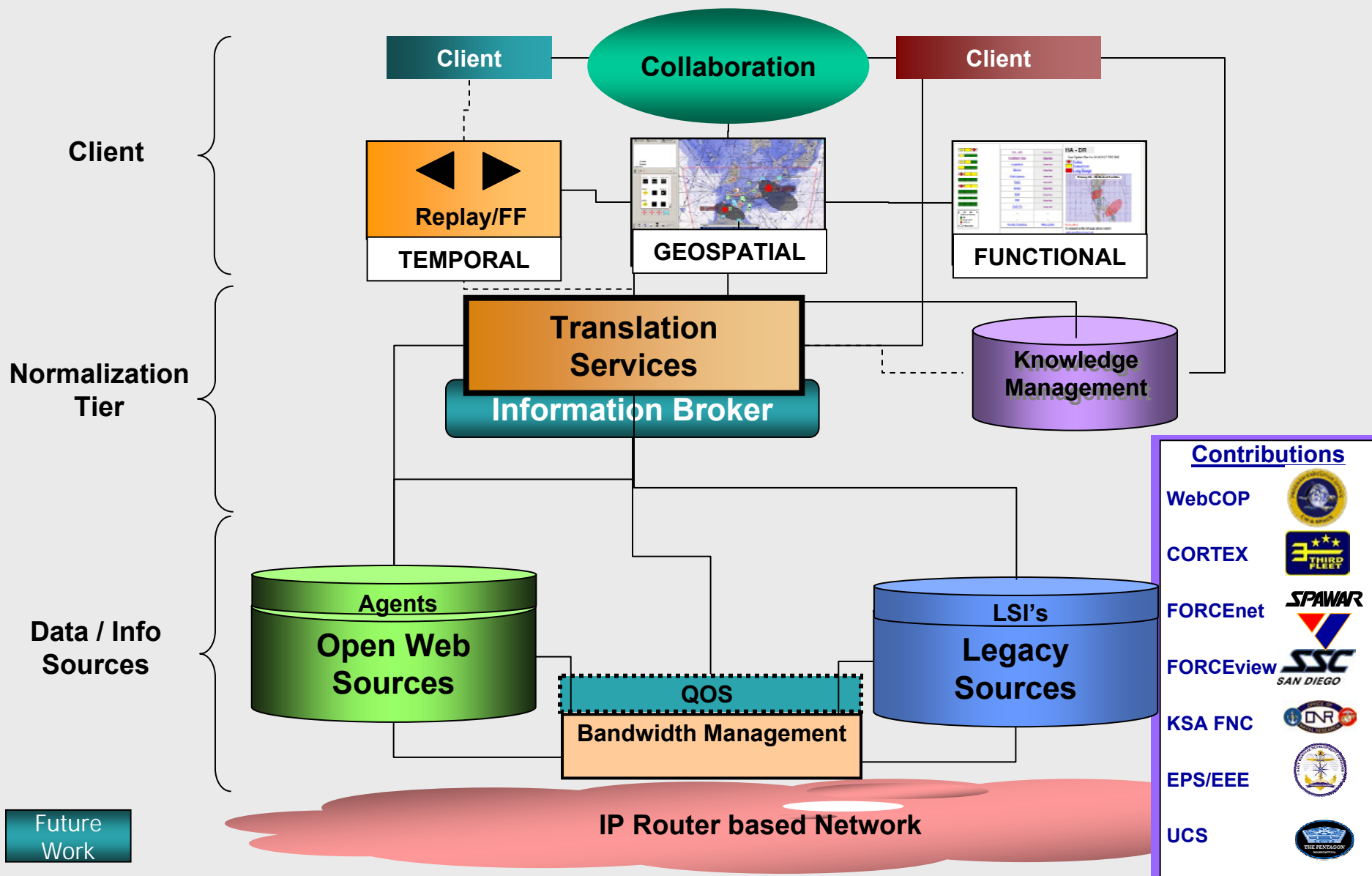
Demonstration Components

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It's about Composeable Functionality – Not the Specific Components

Client (IE5.5+)

- **Client (ABA)**
- **Collaboration**
  - DCTS
  - GeoViz
- **Clients**

- **Temporal (Replay/Forward)** ◄ ►
- **Geospatial**
  - WEBCOP
  - GeoViz
- **Functional**
  - K-Web
  - MS Sharepoint

Normalization Tier

- **Translation Services**
  - GRS
- **Information Broker**
  - XTCF
- **Knowledge Management**
  - VICTOR

Data / Info Sources

- **Agents**
- **Open Web Sources**
- **QOS**
  - BCN
- **Bandwidth Management**
  - BMAC
- **LSI's**
- **Legacy Sources**
  - GCCS-M
  - DADS
  - PC IMAT

IP Router based Network

Future Work

Contributions

- WebCOP
- CORTEX
- FORCEnet
- FORCEview
- KSA FNC
- EPS/EEE
- UCS

The Goal
Composed Capabilities

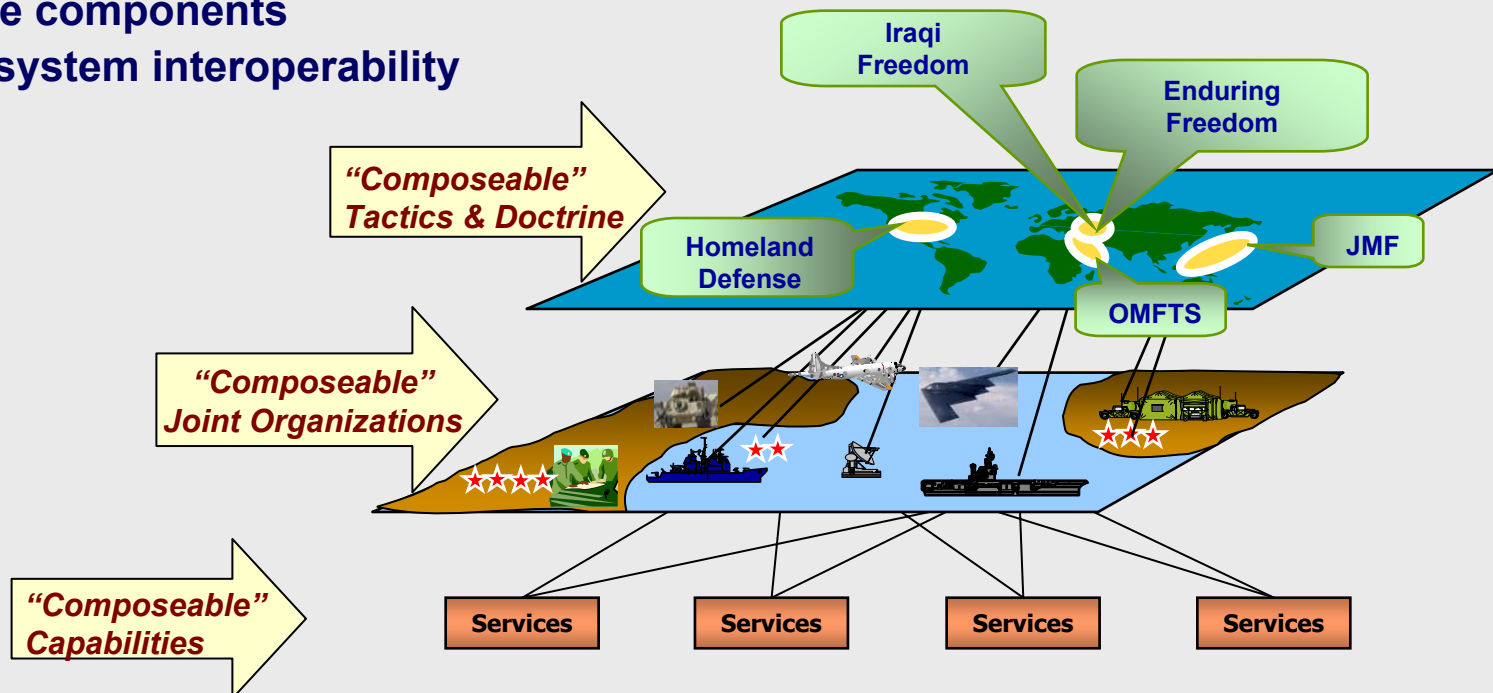# Composeable FORCEnet Through Systematic Experimentation

Transform **Operations**

- **Assemble components on the fly**
- **Joint - Agile - Tailorable**
- **Geospatial –based shared collaboration**
- **Intuitive linkage to information**

Transform **Acquisition**

- **Increase Speed-to-Capability**
- **Reusable components**
- **Legacy system interoperability**

Plug-n-Fight!

"Composeable" Tactics & Doctrine

"Composeable" Joint Organizations

"Composeable" Capabilities

Iraqi Freedom

Enduring Freedom

Homeland Defense

JMF

OMFTS

Services Services Services Services

Summary

- Composeability

  - Components rather than systems of systems

- Composeable FORCEnet

  - Knowledge is the Warrior's Edge

- Composeable FORCEnet demonstrates the tactical and operational advantages of enabling joint warfighting

Summary

- Ultimately, the naval and Joint warfighter – and not the engineers - will use the capabilities needed for the immediate operational and tactical problem.

- Warfighters operating in a Composeable FORCEnet-enabled environment will soon be able to *compose* the C4ISR components developed by the engineering community to ensure superior decision-making.

- This capability has the potential to enable the Joint Force Commander to achieve the maximum degree of operational effectiveness across the spectrum of warfighting and to do it faster than ever before.

Backups

Composeable FORCEnet (Partial list to date)

Honorable Hansford T. Johnson	SECNAV
ADM Vern Clark	CNO
The Honorable Michael Wynn	USD AT&L
ADM Edmund Giambastiani	COMUSJFCOM
The Honorable John Young	ASN RD&A
VADM John Nathman	DCNO, Warfare Rqmts & Programs, N7
VADM Timothy LaFleur	COMSURFPAC
Dr. Michael McGrath	DASN for RDT&E
Ms. Lorraine Wilson	DASN for Integrated Warfare
RADM Kevin Cosgriff	Director, Warfare Integration and Assessment, N70
RADM Thomas Zelibor	Director, Space, IW and C2, N61
RADM David Architzel	COMOPTEVFOR
RADM Henry Ulrich	Dir, Surface Warfare Division, N76
MGEN Robert Kehler	Dir, Nav Sec Space Integ, OUS AF
MGEN Jan Huly, USMC	Dep Commandant Plans, Policies & Ops
RDML Dennis Morral	PEO, Littoral & Mine Warfare
Mr. Jay Parness	Dep Dir, Nav Sec Space Integ, OUS AF
Mr. Don Diggs	Dir C2 Policy & Guidance, OASD NII
BGEN Richard Geraci, USA	Dir, National Security Space Architect
Ms. Uyen Dinh	Counsel House Armed Services Comm
RDML Stephen Johnson	Dir, Undersea Warfare Tech, NAVSEA
ADM Archie Clemins (Ret)	Naval Studies Board
VADM Herb Brown (Ret)	President, AFCEA
VADM Jerry O. Tuttle (Ret)	President & CEO, JOT Enterprises
MAJGEN Tommy Crawford, USAF	Director, USAF C4ISR Center
Ms. Monica Shepard	Director, C4 Systems, CFFC
VADM Christopher Ritchie, RAN	Chief of Navy
ADM William Fallon	Commander, Combined Fleet Forces Command
ADM James Hogg (Ret)	Dir. Strategic Studies Group

Composeable FORCEnet on the Road to DON & Industry

(Partial List to date)

- LTGEN Robert Shea — Dir, C4 Systems, Joint Chiefs of Staff, J6
- RADM Steven Tomaszeski — Navigator of the Navy
- RADM Mark Edwards — Dir. Surface Warfare Division, N76
- RADM Joseph Sestak — Dir. Assessment Division, N81
- RADM (S) Anthony Winns — Dep. Dir. Air Warfare Division, N78B
- RADM (S) Nancy Brown — Vice Dir. C4 Systems, Joint Chiefs of Staff, J6
- RDML Charles Bush — PEO (IWS)
- RDML Andrew Singer — Dep. Commander, Naval Network Warfare Command
- RDML (S) Raymond Spicer — Dep. For Surface Ships, N76E
- Mr. Tom Laux — Dep. PEO AIR
- RDML Stephen Johnson — Dir. Undersea Technology, NAVSEA
- VADM Gary Roughead — COMSECONDFLT

- SPAWAR 2003 Industry Conference, Bahia Hotel
- FORCEnet Operational Advisory Group (OAG), MCTSSA, Camp Pendleton
- MG ROBERT G.F. LEE, NG, State of Hawaii National Guard, Hawaii
- NDIA Strike Land Attack and Air Defense Division (SLAADD), NISC, San Diego
- AFCEA West 2004 Conference
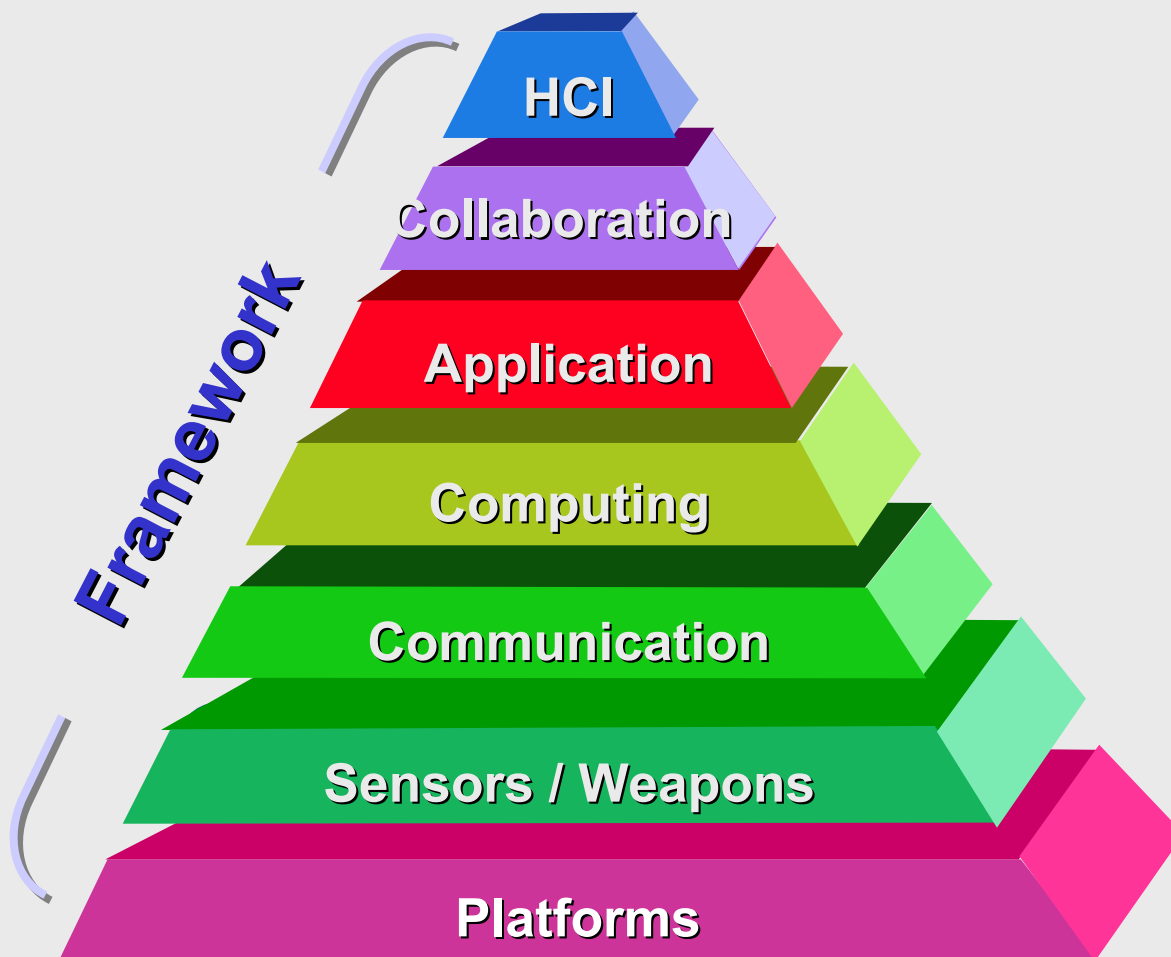
Sample Display
GeoViz subscribes to PC IMAT predictions
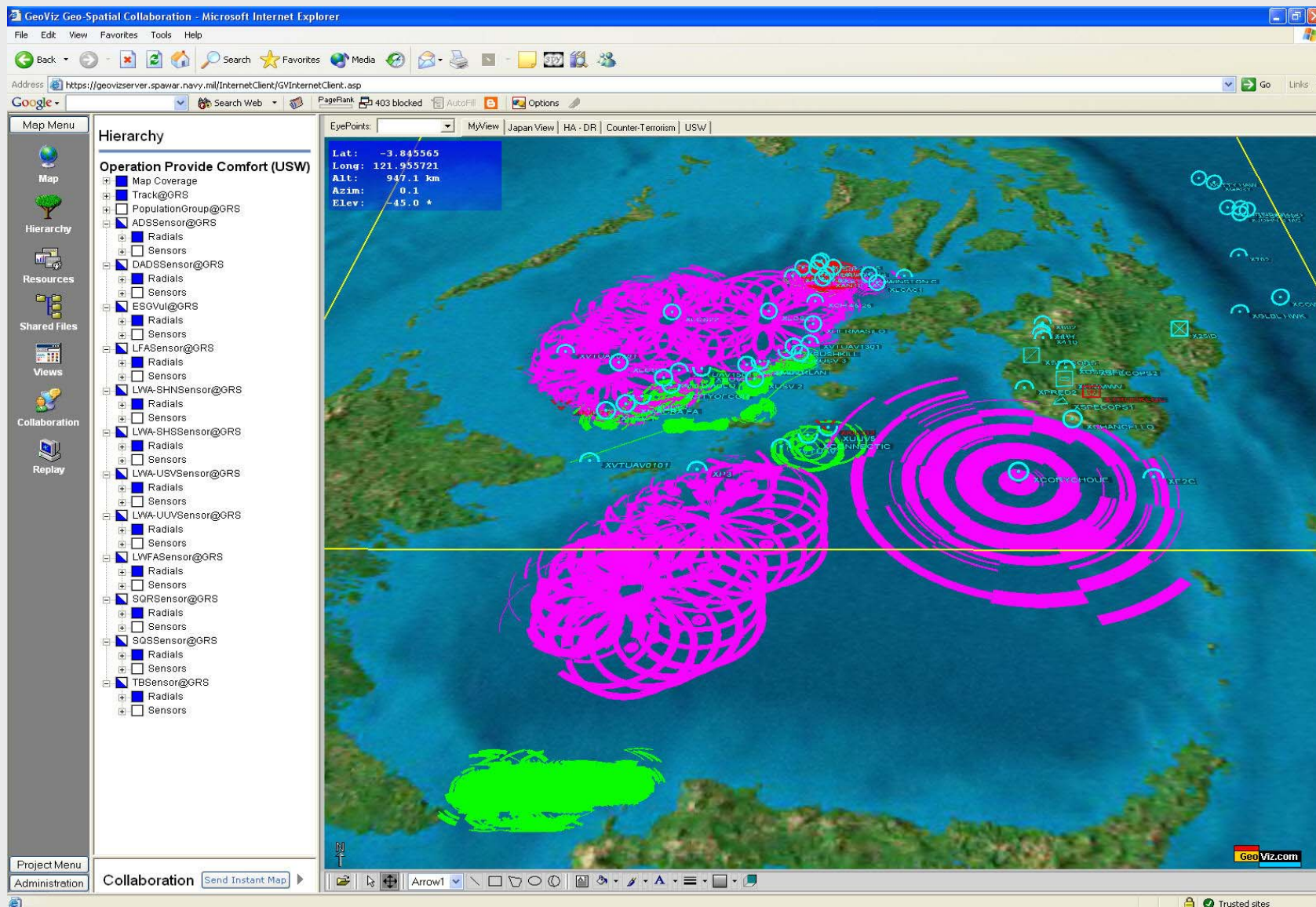
Technology Building Blocks of FORCEnet

Interoperability and Access Through <u>Composeablity</u>

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Metaphors

Standards

Object Framework, Semantic Web

Agents, Virtual Machines

Internet Protocols

Markup Languages

CAPABILITY A

CAPABILITY

Platforms

Framework

<u>Composeable Web Services</u> provide common interfaces across uncommon technical solutions

You use this approach at home the office every day